# Ultra fast low-loss controlled avalanche rectifiers

## BYV27 series

### FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Available in ammo-pack.

### DESCRIPTION

Rugged glass SOD57 package, using a high temperature alloyed construction.

This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

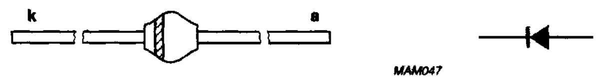



Fig.1 Simplified outline (SOD57) and symbol.

### LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{RRM}$ | repetitive peak reverse voltage | | | | |
| | BYV27-50 | | – | 50 | V |
| | BYV27-100 | | – | 100 | V |
| | BYV27-150 | | – | 150 | V |
| | BYV27-200 | | – | 200 | V |
| | BYV27-300 | | – | 300 | V |
| | BYV27-400 | | – | 400 | V |
| | BYV27-600 | | – | 600 | V |
| $V_R$ | continuous reverse voltage | | | | |
| | BYV27-50 | | – | 50 | V |
| | BYV27-100 | | – | 100 | V |
| | BYV27-150 | | – | 150 | V |
| | BYV27-200 | | – | 200 | V |
| | BYV27-300 | | – | 300 | V |
| | BYV27-400 | | – | 400 | V |
| | BYV27-600 | | – | 600 | V |
| $I_{F(AV)}$ | average forward current | $T_{tp}$ = 85 °C; lead length = 10 mm; see Figs 2 and 3; averaged over any 20 ms period; see also Figs 10 and 11 | | | |
| | BYV27-50 to 200 | | – | 2.0 | A |
| | BYV27-300 and 400 | | – | 1.9 | A |
| | BYV27-600 | | – | 1.6 | A |
| $I_{F(AV)}$ | average forward current | $T_{amb}$ = 60 °C; PCB mounting (see Fig.18); see Figs 4 and 5; averaged over any 20 ms period; see also Figs 10 and 11 | | | |
| | BYV27-50 to 200 | | – | 1.30 | A |
| | BYV27-300 and 400 | | – | 1.25 | A |
| | BYV27-600 | | – | 1.00 | A |
| $I_{FRM}$ | repetitive peak forward current | $T_{tp}$ = 85 °C; see Figs 6 and 7 | | | |
| | BYV27-50 to 400 | | – | 20 | A |

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $I_{FRM}$ | repetitive peak forward current | $T_{amb}$ = 60 °C; see Figs 8 and 9 | | | |
| | BYV27-50 to 200 | | – | 14 | A |
| | BYV27-300 and 400 | | – | 13 | A |
| $I_{FSM}$ | non-repetitive peak forward current | t = 10 ms half sine wave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$ | | | |
| | BYV27-50 to 400 | | – | 50 | A |
| | BYV27-600 | | – | 40 | A |
| $E_{RSM}$ | non-repetitive peak reverse avalanche energy | L = 120 mH; $T_j = T_{j\,max}$ prior to surge; inductive load switched off | – | 20 | mJ |
| $T_{stg}$ | storage temperature | | −65 | +175 | °C |
| $T_j$ | junction temperature | | −65 | +175 | °C |

## ELECTRICAL CHARACTERISTICS

$T_j$ = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 2 A; $T_j = T_{j\,max}$; see Figs 12; 13 and 14 | | | | |
| | BYV27-50 to 200 | | – | – | 0.78 | V |
| | BYV27-300 and 400 | | – | – | 0.82 | V |
| | BYV27-600 | | – | – | 1.05 | V |
| $V_F$ | forward voltage | $I_F$ = 2 A; see Figs 12; 13 and 14 | | | | |
| | BYV27-50 to 200 | | – | – | 0.98 | V |
| | BYV27-300 and 400 | | – | – | 1.05 | V |
| | BYV27-600 | | – | – | 1.25 | V |
| $V_{(BR)R}$ | reverse avalanche breakdown voltage | $I_R$ = 0.1 mA | | | | |
| | BYV27-50 | | 55 | – | – | V |
| | BYV27-100 | | 110 | – | – | V |
| | BYV27-150 | | 165 | – | – | V |
| | BYV27-200 | | 220 | – | – | V |
| | BYV27-300 | | 330 | – | – | V |
| | BYV27-400 | | 440 | – | – | V |
| | BYV27-600 | | 675 | – | – | V |
| $I_R$ | reverse current | $V_R = V_{RRMmax}$; see Fig.15 | – | – | 5 | μA |
| | | $V_R = V_{RRMmax}$; $T_j$ = 165 °C; see Fig.15 | – | – | 150 | μA |
| $t_{rr}$ | reverse recovery time | when switched from $I_F$ = 0.5 A to $I_R$ = 1 A; measured at $I_R$ = 0.25 A; see Fig.20 | | | | |
| | BYV27-50 to 200 | | – | – | 25 | ns |
| | BYV27-300 to 600 | | – | – | 50 | ns |
| $C_d$ | diode capacitance | f = 1 MHz; $V_R$ = 0 V; see Figs 16 and 17 | | | | |
| | BYV27-50 to 200 | | – | 100 | – | pF |
| | BYV27-300 and 400 | | – | 80 | – | pF |

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $\left\lvert \frac{dI_R}{dt} \right\rvert$ | maximum slope of reverse recovery current<br>BYV27-50 to 400 | when switched from $I_F = 1$ A to $V_R \geq 30$ V and $dI_F/dt = -1$ A/µs; see Fig.19 | – | – | 4 | A/µs |

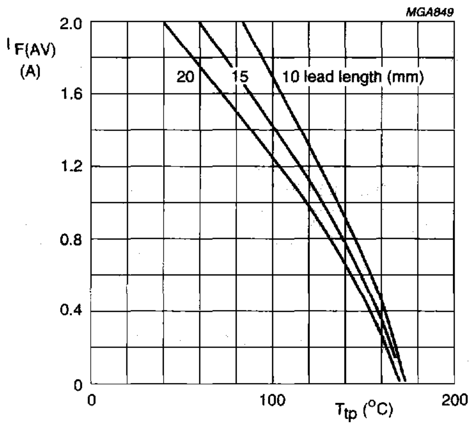
**THERMAL CHARACTERISTICS**

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th\ j\text{-}tp}$ | thermal resistance from junction to tie-point | lead length = 10 mm | 46 | K/W |
| $R_{th\ j\text{-}a}$ | thermal resistance from junction to ambient | note 1 | 100 | K/W |

**Note**

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥40 µm, see Fig.18. For more information please refer to the *'General Part of Handbook SC01'*.

## GRAPHICAL DATA

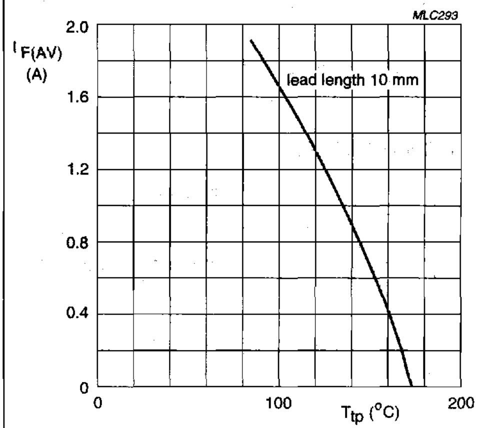



**BYV27-50 to 200**

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.

Switched mode application.

Fig.2 Maximum permissible average forward current as a function of tie-point temperature (including losses due to reverse leakage).

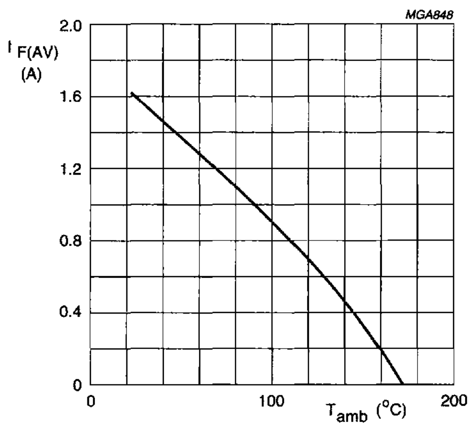



**BYV27-300 and 400**

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.

Switched mode application.

Fig.3 Maximum permissible average forward current as a function of tie-point temperature (including losses due to reverse leakage).



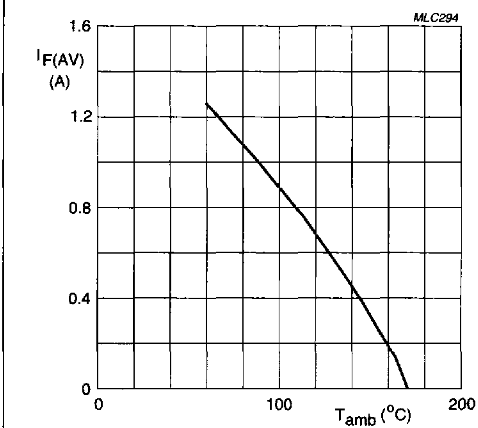

**BYV27-50 to 200**

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.

Device mounted as shown in Fig.18.

Switched mode application.

Fig.4 Maximum permissible average forward current as a function of ambient temperature (including losses due to reverse leakage).



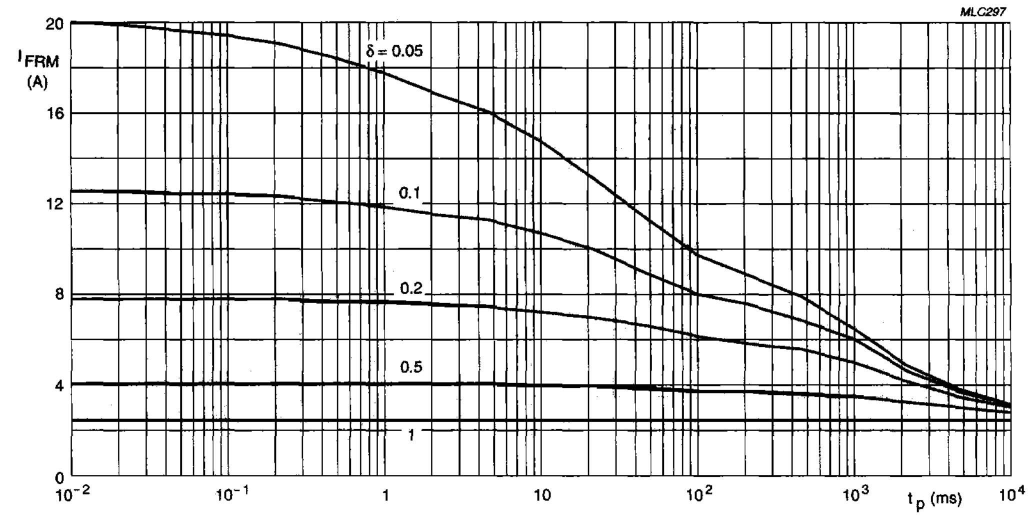

**BYV27-300 and 400**

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.

Device mounted as shown in Fig.18.

Switched mode application.

Fig.5 Maximum permissible average forward current as a function of ambient temperature (including losses due to reverse leakage).

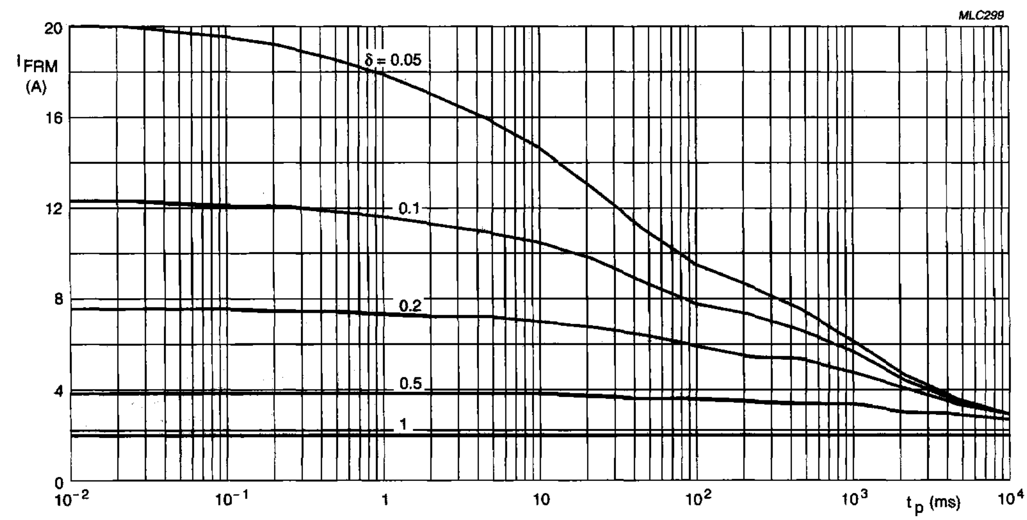



**BYV27-50 to 200**

$T_{tp}$ = 85°C; $R_{th\ j\text{-}tp}$ = 46 K/W.

$V_{RRMmax}$ during 1 – δ; curves include derating for $T_{j\ max}$ at $V_{RRM}$ = 200 V.

Fig.6 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.

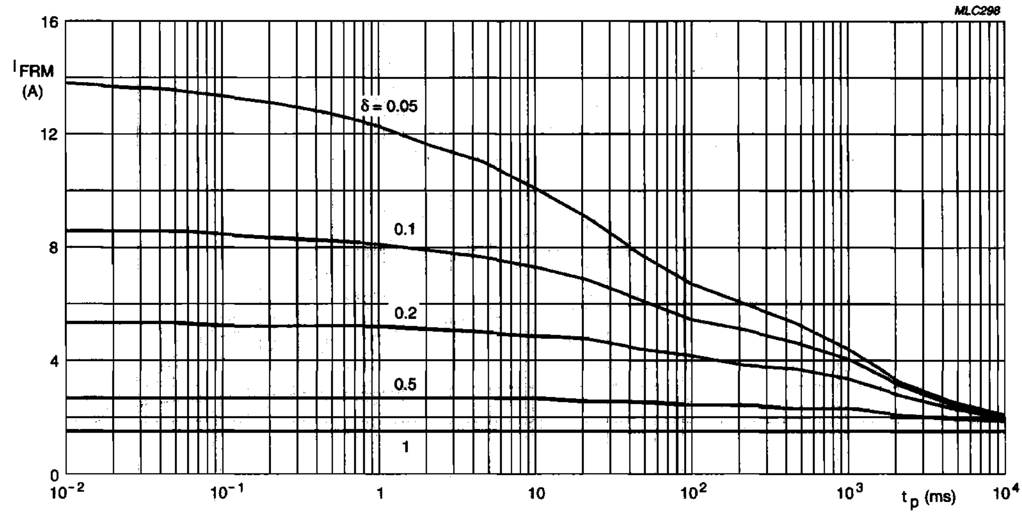



**BYV27-300 and 400**

$T_{tp}$ = 85°C; $R_{th\ j\text{-}tp}$ = 46 K/W.

$V_{RRMmax}$ during 1 – δ; curves include derating for $T_{j\ max}$ at $V_{RRM}$ = 400 V.

Fig.7 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.

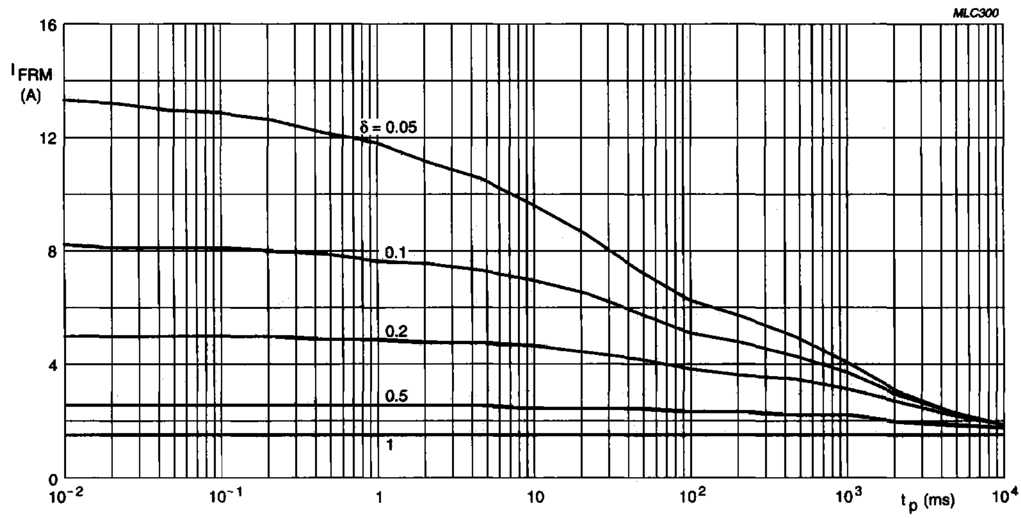



**BYV27-50 to 200**

$T_{amb}$ = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W.

$V_{RRMmax}$ during 1 – δ; curves include derating for $T_{j\ max}$ at $V_{RRM}$ = 200 V.

Fig.8 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.

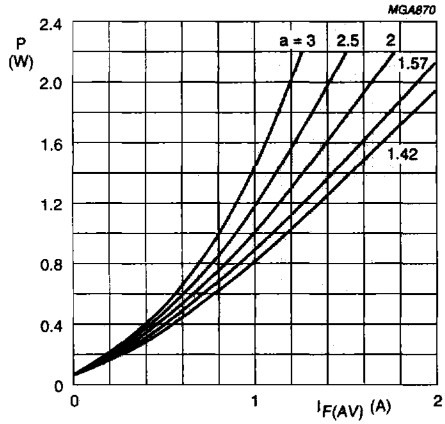



**BYV27-300 and 400**

$T_{amb}$ = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W.

$V_{RRMmax}$ during 1 – δ; curves include derating for $T_{j\ max}$ at $V_{RRM}$ = 400 V.

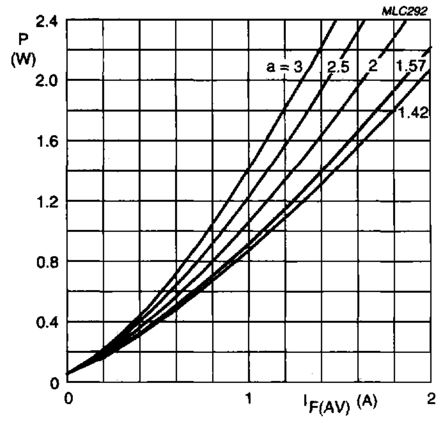
Fig.9 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.




**BYV27-50 to 200**

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$; $\delta = 0.5$.

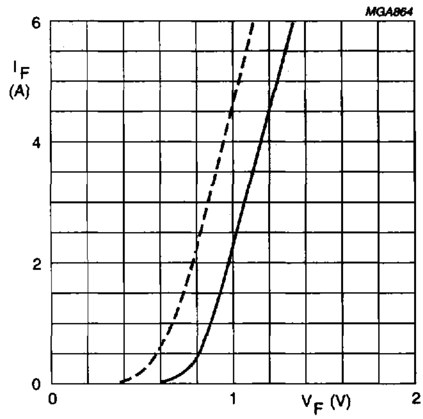
Fig.10 Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current.




**BYV27-300 and 400**

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$; $\delta = 0.5$.

Fig.11 Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current.

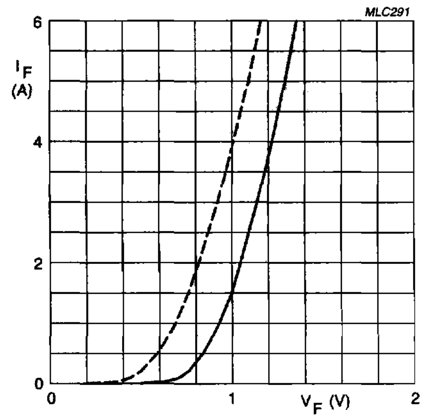



**BYV27-50 to 200**

Dotted line: $T_j = 175$ °C.

Solid line: $T_j = 25$ °C.

Fig.12 Forward current as a function of forward voltage; maximum values.

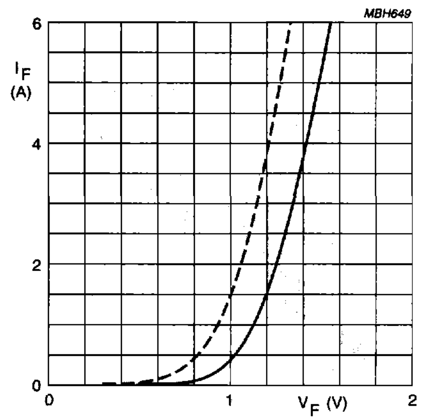



**BYV27-300 and 400**

Dotted line: $T_j = 175$ °C.

Solid line: $T_j = 25$ °C.

Fig.13 Forward current as a function of forward voltage; maximum values.

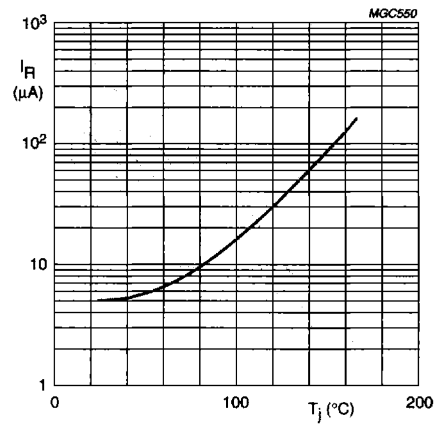



**BYV27-600**

Dotted line: $T_j$ = 175 °C.

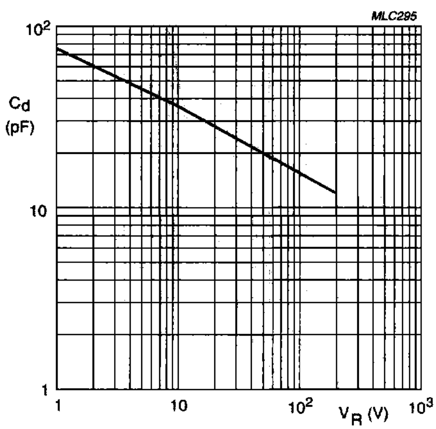
Solid line: $T_j$ = 25 °C.

Fig.14 Forward current as a function of forward voltage; maximum values.




$V_R = V_{RRMmax}$.

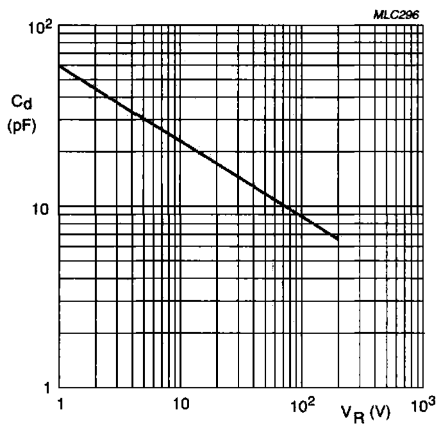
Fig.15 Reverse current as a function of junction temperature; maximum values.




**BYV27-50 to 200**

f = 1 MHz; $T_j$ = 25 °C.

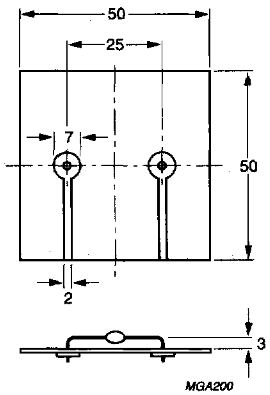
Fig.16 Diode capacitance as a function of reverse voltage; typical values.




**BYV27-300 and 400**

f = 1 MHz; $T_j$ = 25 °C.

Fig.17 Diode capacitance as a function of reverse voltage; typical values.




Dimensions in mm.

Fig.18 Device mounted on a printed-circuit board.

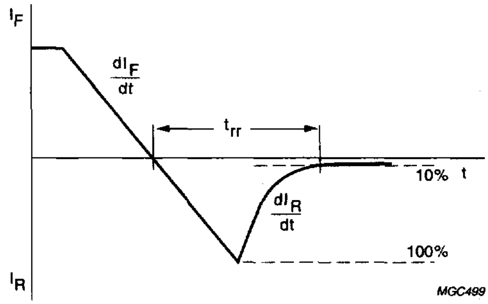
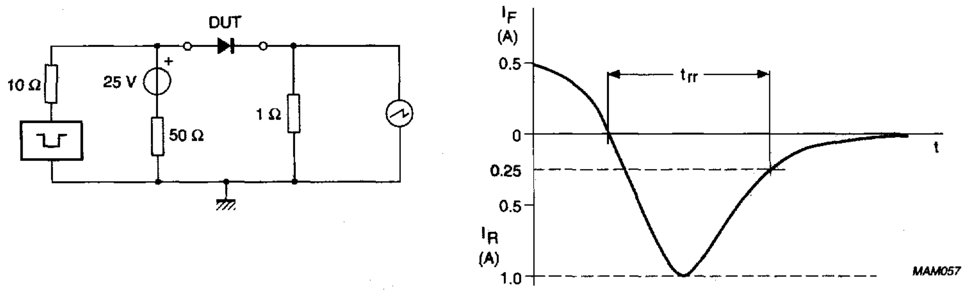



Fig.19 Reverse recovery definitions.




Input impedance oscilloscope: 1 MΩ, 22 pF; $t_r \leq 7$ ns.
Source impedance: 50 Ω; $t_r \leq 15$ ns.

Fig.20 Test circuit and reverse recovery time waveform and definition.